


BRIDGMAN'S GUIDE  
FOR THE  
PRESERVATION  
OF THE  
TEETH  

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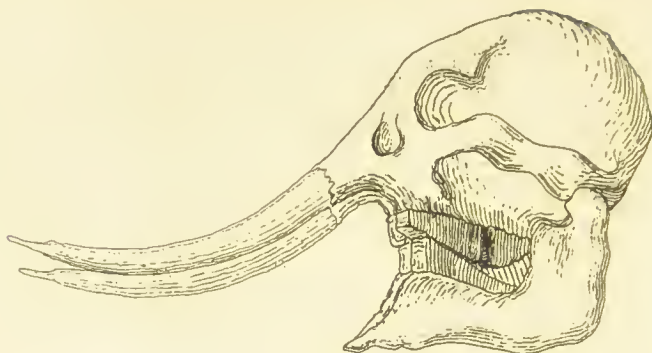
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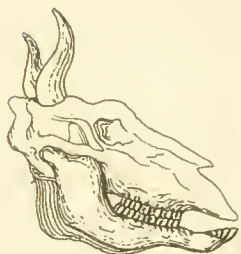


A COMPARATIVE VIEW OF THE TEETH OF DIFFERENT CLASSES OF ANIMALS.

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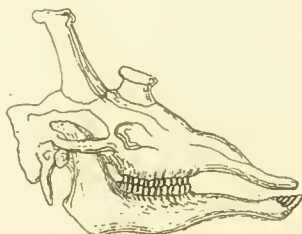


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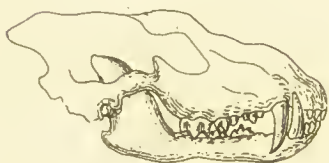


COW

(*Ruminantia*)



GIRAFFE



TIGER

(*Carnivora*)



WOLF



RABBIT

(*Kodentia*)



SQUIRREL

Etched by W K Bridgman

A GUIDE  
FOR THE  
PROPER TREATMENT OF THE TEETH,  
WITH A VIEW TO  
THEIR PRESERVATION:  
CONTAINING A POPULAR  
EXPLANATION OF THEIR STRUCTURE AND APPENDAGES,  
WITH DIRECTIONS FOR  
THE MANAGEMENT OF THEM IN HEALTH,  
AND  
TREATMENT IN DISEASE,  
TOGETHER WITH  
OBSERVATIONS ON THE BEST MEANS OF REPLACING  
THEM WHEN LOST:

BY  
W. KENCELY BRIDGMAN,  
DENTIST.

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## INTRODUCTION.

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WE learn from the writings of Herodotus, the first Grecian historian, that in the time of the ancient Egyptians, or more than two thousand years ago, “there were individual healers for each individual distemper, some taking charge of the disorders of the eyes, others of the head, and *others of those of the teeth* ;” yet, although we are thus able to connect the practice of Dental Surgery with the remotest antiquity, as a science it is comparatively of but recent date. It was not until about the close of the seventeenth century, when the strong enthusiasm for experimental philosophy led to the establishment, in 1663, of the present Royal Society, and in 1666, of the Academy of Sciences in France, that we may date its revival in modern times, as a separate branch of medical practice. In the beginning of the eighteenth century, persons destined for the

profession of Dentists in France, were compelled to undergo a regular examination ; but in England, as is well known, no such proof of qualification is required ; and it is owing to the absence of this salutary test that so much discredit has been brought upon the profession. The early part of this century, not fifty years since, may be dated as the commencement of the present enlightened state of its professors : in 1803, the justly celebrated work of Fox, one of the first members of the medical profession, whose practical attention was exclusively devoted to the teeth, made its appearance ; since which, numerous others by various eminent Professors, each adding to the then rapidly increasing fund of knowledge, have followed and been the means of elevating the character of the profession to its present highly advanced state. To so great a degree of perfection has it now attained, that the economy of the teeth and the nature and treatment of their diseases have become reduced to as perfect a system as are those embraced by the general practitioner. One of the principal remaining desiderata is to procure for the

public the same protection which is afforded in every other branch of medical practice. Until this be obtained, the only security against the injurious effects of empiricism, lies in the public being made acquainted with the proper management of the mouth, and the nature of the diseases of the teeth, as well as the principles upon which their treatment is founded. From this, another considerable advantage may also accrue—nothing but a knowledge of the structure of the teeth and the inevitable results of neglect or mismanagement of the mouth is required to ensure a more general attention to the care of them. With this view the following pages have been written; and although necessarily concise in the descriptions, it is hoped they are sufficiently clear and intelligible for the general reader.

The instructions for the management of the teeth invariably accord with the practice of the most eminent dentists of the day; while in the treatment of second dentition, attention is drawn to the form of the palate, as aiding materially in prognosticating the ultimate regularity and position of the teeth;

the value of this will be clearly perceived when fairly contrasted with all the uncertainty which has hitherto attended its general treatment. In connexion with this, in the different forms of the dental curve, the certain results peculiar to each are accounted for, and by thus referring to the cause, affords an opportunity of profiting from the adage that “prevention is better than cure.”

69, *St. Giles' Street, Norwich,*  
*September, 1846.*

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#### ERRATA.

Page 17 line 111, for "sideways" read "about."

— 46 — x, — "prevcnting" read "prescrving."

# THE VALUE

## AND

### IMPORTANCE OF THE TEETH.

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THE peculiar and delicate construction of these organs, as well as their great importance in the animal economy, claims from their earliest development the utmost attention: yet, unfortunately, they seldom meet with this, most probably from being but very imperfectly understood. They are too apt to be considered merely as desirable appendages, to be preserved indeed, if nature so will it, but not of sufficient consequence to render a knowledge of their economy and suitable treatment an indispensable acquirement. This is the more to be regretted, as the evils attendant upon the loss of them or their becoming diseased—a too common result of neglect or improper usage—is far greater than is generally supposed. Their

influence on the expression of the countenance and on the voice—the latter, unfortunately, only appreciated, like most other of our blessings, by its loss—is too palpable not to be observed by every one; while the primary use for which the teeth were designed, appears to be in a great measure overlooked. I mean the mastication of the food, which is one of the most essential parts of the process, whereby the health of the whole system is maintained; for, unless this be properly effected, the action of the stomach becomes debilitated, and gives rise to Indigestion. The mere mechanical division of the food is but a minor part of the operation; the more essential being its thorough incorporation with the saliva, which takes place in its trituration by the teeth. In the interesting experiments on Alexis St. Martin,\* whose stomach had been perforated by the discharge of a musket, and had recovered with a permanent opening, thus affording an oppor-

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\* By Dr. Beaumont, and detailed in Coombe's *Physiology of Digestion*.



tunity of observing the process of digestion, the effects of these preparatory measures were most satisfactorily proved. Food was introduced in every variety of state, and the action of the stomach upon it narrowly watched; and it was invariably found, that proper and sufficient mastication was required to ensure a perfect digestion. If, however, the apparatus for this purpose be defective, or in a state of disease, it must be sufficiently apparent that its work can be but imperfectly performed. For such reason, then, it is very desirable that these organs should be preserved complete and in a healthy condition. The loss of a tooth from the back of the mouth, where its absence might pass undetected, is generally treated as a matter of indifference; but this, unhappily, is a very injurious mistake, as these teeth form a very important part of the set; the Almighty creating nothing in vain.

Considered in relation to the other parts of the system, the value and influence of the teeth will be more easily comprehended by a comparison of those of the human body with those

of different animals. Here, among the simplest forms of the denture, or systems of teeth, is that of the Elephant; and every one who has witnessed his manner of receiving and disposing of his food, must have been struck by the peculiarity of his action, as well as the unsightliness and singular form of his mouth. One of the first requirements in taking food, is obviously the means of apportioning it into suitable mouthfuls. This, in the absence of teeth in the front of the lower jaw, is accomplished by the end of the trunk. With this organ he collects it in convenient parcels, and, turning it up, conveys it to his mouth, where, by a masticating apparatus composed of two pairs of laminated masses with roughened surfaces, it is ground down to an impalpable pulp. These grinders vary in number, in the different species, from eight to twelve, and being subject to wearing away by the friction, are made to advance in the mouth by others coming from behind to replace them. The tusks are quite independent of this machine, and appear to be formed principally, if not wholly, as weapons of defence.

A step in advance of the elephant towards a more perfect form of the compound denture, may be seen in the Cow, the Deer, and the Giraffe. In the ruminating animals, the class to which these belong, the front of the mouth is provided with six or eight incisors in the lower jaw, and an elastic pad in the upper, opposite to them. The long and flexible tongue is employed in drawing the food between these, and by a jerk of the head, its separation is effected. But here, also, another peculiarity exists: the food so cropped, after being slightly bruised, is passed to a separate receptacle, whence it is returned at the will of the animal, to be ground down at its leisure. This is the process termed "chewing the cud," and is evidently one of extreme gratification. The better to accomplish this trituration, the teeth are composed of three distinct substances of different degrees of hardness, arranged in vertical plates, running parallel with the length of the jaw; and these, by wearing away unequally, always preserve the series of ridges on their surfaces.

In passing to a third class of vegetable feeders—the *Rodentia*, or gnawing animals—as for instance, the Squirrel, the Rat, the Beaver, the Hare, and the Rabbit, we find a totally different arrangement of the whole apparatus. The front teeth consist of two pairs of peculiarly formed incisors, meeting together like a pair of pincers. To render the cutting effects of such teeth more complete, they are made to assume the form of a wedge or chisel, and are provided with the means of retaining a sharp edge, by being coated with enamel on their anterior surfaces only. Their use appears to be one of the greatest consideration; for the other parts of the apparatus are accommodated to them, by a peculiar modification in their construction. The incisors work together like a pair of scissors; the edges of the lower passing up behind those of the upper. Hence the lower jaw is required to be moved backwards and forwards; and, as a lateral movement would render the cutting tool rickety and interfere with its usefulness, the motion of the jaw is restricted to this one direction. The molar

teeth, to become applicable to such planing motion, have the ridges on their surfaces placed *transversely*, and are thus enabled to accomplish the required trituration.

The power of moving the lower jaw in different directions, is yet further diminished in the *Carnivora*, or flesh eaters, by being confined to the mere up-and-down motion required in opening and closing the mouth. The beautiful design, however, of this limitation will be clearly seen on an inspection of the teeth themselves. Instead of the broad-topped molars, required in grinding the leaves and stalks of vegetables, these teeth rise into several lance-shaped points of enamel, and when the jaws are closed, overlap each other like incisors. Such arrangement is admirably suited to the purpose of cutting and tearing flesh, but would be utterly useless to animals born to subsist on seeds or vegetables, while the peculiar form of the hinge or joint is evidently that which is best calculated to afford the greatest assistance. A familiar example of a joint of this description, on a miniature scale, may be

seen in the claw of the Lobster ; which, while it can be opened and closed with perfect ease, is quite immoveable in every other direction, and affords an admirable illustration of the perfection and beauty with which all the contrivances of nature are adapted in the most simple manner to the ends required.

Thus may we find, throughout the entire range, some variation in the construction of the teeth in almost every family. But this is not all ; for the utility of these nice adjustments would be greatly diminished, were not the other parts of the animal frame arranged in accordance with the several peculiarities of form. The levers, as well as the muscles by which they are worked, are all varied to suit the different cases ; while the instinct and the appetites of the animal lead to the selection of its appropriate food, and, at the same time, to the requisite movement of the machinery for its preparation. So essentially necessary, in fact, is the latter step, that in some instances we find the apparatus placed, as it were, beyond the control of the individual. In the domestic

fowl and numerous other birds which feed on grain, the office is transferred from the mouth to the gizzard—a dense muscular substance, in the form of two hemispheres, with callous, ridged surfaces on their inner sides. Between these the seeds are crushed: and to render the operation more effectual, the birds habitually swallow with their food, small, angular pebbles, which serve the purpose of teeth. Deprive them of these, and they become unhealthy and waste away; and many a poor bird in confinement has, doubtless, lost its life from the simple cause, that the sand in its cage was too fine to answer the purpose. In other instances, where a similar measure would be too precarious, if left to the will of the creature, the internal surface of the gizzard is provided with teeth, in the form of minute spines or horny ridges. This is the case in all the insects which feed on hard substances—as the wood and bark of trees—and also in those which are carnivorous.

Now, when we see in the lower animals, such extraordinary pains taken in providing the means of preparing the food, and such care

manifested to ensure its accomplishment, it can never be supposed that the more perfect denture of man was so formed to be of less use to him, or of less consequence to his existence. The admission, then, of the paramount importance of the teeth, in this view alone, should be sufficient to induce in us a desire for adopting all the known means which can aid in their preservation, and should act as a caution against allowing ourselves to indulge in any of those habits which are liable to inflict injury on them.

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## STRUCTURE OF THE TEETH AND THEIR APPENDAGES.

The entire set of teeth, as contained in the mouth, is divided into two portions, one of which is attached to the bones of the face, and is perfectly immoveable; while the other portion is affixed to a separate bone, hung to those of the head by a joint of very peculiar formation. It is so admirably contrived, that, in addition to



the up-and-down motion required in opening and closing the mouth, it is capable of being moved sideways in every direction; thus giving, by the great freedom of the joint, every facility to the action of the teeth in mastication. Both portions of the set contain teeth of four different characters, each class best suited to the duties required of it—the Incisors, Cuspids, Bicuspids, and Molars.

On separating the lips, the first object which generally attracts attention is the pair of large teeth in the upper row, directly in the front of the mouth. These are called the central incisors, and are supported on each side by the lateral ones. In the four corresponding teeth of the lower row, there is much less disparity of size, and the above order is reversed, the smaller pair being placed in the centre. One peculiarity, however, of formation belongs to all of them—that is, they are wedge-shaped, thick at the neck, and gradually tapering to an edge. In a well-shaped mouth, their arrangement, side by side, produces two regularly curved ridges; and the lower ones, passing

behind the upper,\* by an action resembling that of a pair of shears or scissors, has given rise to the name, incisors, or cutting teeth.

Immediately beyond these stand the cuspids, or canine teeth; termed, in the upper jaw, *eye teeth*. Their principal office is that of tearing such portions of food as are of too tough or fibrous a texture to be cut by the incisors.

Next in order are the Bicuspids, or small grinders; of which there are two on each side in either jaw, eight in all; and with them commences the double ridge. The division of their upper surface, by a transverse channel, into two points or cuspids, has given them the name bicupid, or two-pointed. This formation limits the approach of the jaws in closing; for the point of one tooth rests in the corresponding depression of that opposite;† were it not for which, the incisors and cuspids might pass each other till their edges were met by the gums.

The Molars, or large grinders, are the great teeth situate at the back of the mouth,

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\* Plate 3, fig. i.

† Plate 3, fig. ii.

and though placed last in the series, are first in importance as organs of mastication. With these teeth, the food, which has been previously reduced to small portions by cutting and tearing, is ground down to an impalpable mass between their broad indented surfaces, and receives, by being intimately blended with the saliva, its final preparation for the stomach.\*

Each tooth is divided, anatomically, into two portions, the crown, and its fang or fangs. The crown comprises the part usually seen above the gums, and the fang or root that by which the tooth is supported in the jaw. The line uniting the two is the part to which the edge of the gum is attached, and is termed the neck.

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\* The saliva is a transparent fluid, secreted by the salivary glands, and poured into the mouth in considerable abundance during a meal, for the especial purpose of being mixed with the food in the process of mastication. At other times it is produced only in sufficient quantities to lubricate the mouth and the parts adjacent. It generally contains in solution, portions of the phosphate and carbonate of lime, as well as a small quantity of common salt. It is by the evaporation of the fluid that these substances are deposited on the teeth, forming tartar, or salivary calculus.

With a successive increase in the size of the teeth, as their position becomes more remote from the centre of the dental arch, is a proportionate increase in the size and number of their fangs. In the lower jaw, the incisors, cuspids, and bicuspid have but one fang each; and the molars, two; but in the upper, the bicuspid are partially separated into two, and the molars have three fangs each.

The internal bony substance of both portions of a tooth is precisely the same: the difference in their appearance arises from the great dissimilarity of the coverings whereby the respective parts are protected. The crown has an encrusting case, of a dense, crystalline texture—the Enamel—which is much the hardest of all known animal substances. The fang is covered with a thin membrane, termed the Periosteum, adhering closely to its surface. All bones are partially invested with this membrane: it serves as a medium of support for the intricate network of vessels of circulation and absorption, which enter their substances by innumerable minute apertures on the surface

beneath it. Bones denuded of this covering have their means of nourishment cut off; and the death of the part follows as a natural consequence.

What is commonly called the nerve of a tooth, is, in reality, a portion of this periostial membrane, lining its interior, and designed for the support and nourishment of its stony-covered crown. Thus, instead of its being merely a nerve, it consists of a highly organized substance, supplied with a nerve, artery, and vein, all which enter the extremity of the fang by an aperture scarcely perceptible to the unassisted eye. In this contrivance we have one of those beautiful examples of the adaptation of means to an end, with which the whole creation abounds. The fang of the tooth is supplied with nourishment by the aid of its external periosteum. This covering, which attaches it to the sides of the cavity wherein it is contained, and also serves the purpose of an elastic cushion between them, extends no higher than the neck of the tooth, where it is lost by uniting with the gums. The crown, being

covered with enamel, has no other means of maintaining its vitality, than from within. For this object, therefore, a cavity, corresponding to the outward form of the tooth, is placed in its centre, where the membrane and its vessels, entering the end of the fang, become expanded, filling the whole extent, and forming the medium for its support.

The bone of the teeth, like all other bones, is composed of two distinct and dissimilar substances, the one an organized animal structure, the other a mineral substance, principally compounded of lime. The solubility of the latter in some of the acids affords us an opportunity of verifying this by an easy experiment. If a tooth be kept for a few hours in diluted muriatic acid, and then taken out and examined, it will be found that all the enamel has disappeared, and, from the abstraction of the lime, the bone itself has become soft and elastic. If, in this state it be allowed to dry, it will become transparent, and of little more than half its original size.

This residuc is the gelatinous or organized portion of the bone, and has been discovered

by Purkinje to consist of tubular fibres, radiating from the central cavity and canals towards the external surface. Further experiments by Professor Müller, one of the most celebrated physiologists of the day, have gone far to prove that these tubes, or parts of them, are filled with inorganic calcareous salts. Mr. Nasmyth observes, that "Inasmuch as the dental fibres have their white colour destroyed by acids, whilst the intermediate substance remains transparent, it follows that either the parietes of the tubes, or their interior, must contain calcareous salts:"\* and considers that, in the formation of the teeth, the soft, organic, cellular substance passes, by *transition*, to the state of perfect bone; but, whatever may be the mode of conversion, the tooth is found, in the earlier stage of its formation, with a portion of bone in its perfect state, only on its exterior surface. The parts first undergoing the change are the cutting edges of the incisors, the points of the cuspids and bicuspid,

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\* *Researches on the Development, Structure, and Diseases of the Teeth*, by Alexander Nasmyth, F.L.S, F.G.S, &c. p. 47.



with the tubercles on the grinding surface of the molars. It does not commence with all the teeth simultaneously, but with one pair at a time, in the order of their appearing in the mouth. Thus, on dissecting the jaws of a child, they are seen in the different stages of development. I possess a preparation exhibiting the progress made in this interesting process at the time of birth; in this set, the central incisors consist of but a thin shell of bone, the deposition of enamel not having yet commenced; in the others each pair is successively less advanced in the order of being cut in the mouth.

The removal of one element in the composition of the teeth, is the cause of those unpleasant sensations experienced in these organs when subject to the action of acids. The solution of the lime, leaves the organic tissue unprotected, which then becomes highly sensitive, and painful on the application of heat or cold. For this reason extreme caution should be used during the exhibition of acid medicines; these should be taken through a glass tube,



placed as far back on the tongue as possible, and the teeth immediately afterwards brushed with some alkaline powder.

The teeth, as contained in the bones of the mouth, are fixed by the insertion of their roots within appropriate cells, each fang having its own separate socket. These cells are termed the alveoli or alveolar cavities, and form a portion of the bones of the jaw, (the maxillæ or maxillary bones.)

The teeth and their alveoli correspond in form, number, and size—one side of the mouth with the other. The whole body, anatomically considered, is composed of two symmetrical halves, and the line formed by their union is known as the medial line. In the lower portion of the face, this is apparent in the groove on the upper lip, and in the mouth it may be traced on the tongue, as well as in the parts both above and below it. On opening the mouth, the two central incisors will be seen to be placed one on each side this division, and each tooth beyond it to pair with the one in a corresponding position on the opposite side of the same jaw.

The arrangement is so regulated with regard to their relative size, that when the mouth is closed, a single tooth in the upper jaw comes in contact with two in the lower.\* The effects of pressure in mastication, are by this position more equally distributed, and in the event of any one of the side teeth being lost, the others are not left entirely without antagonists.

The degree of perfection to which the mouth has attained in the adult state, when it consists of thirty-two teeth, is the result of a series of highly interesting and progressive stages. During that period of infancy, in which the whole nourishment is obtained by suction, teeth would be useless, or even in the way ; but after a time, when food of somewhat more solidity is generally required, nature provides for the change by furnishing these organs for its preparation. The first, or milk teeth, however, being intended but to serve a temporary purpose, are very different in character to those by which they are ultimately succeeded. They are not only smaller and less robust in form, but their

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\* Plate 4, fig. iv.

structure is less dense, and they are but twenty in number. The beginning of the seventh year is usually the time when the first of their permanent successors is about to make its appearance. This change is indicated by the protuberance of the gums beyond the last molars of the first set, whence the four first molars of the second set are about to emerge. From the seventh to the end of the fourteenth year is occupied in developing the whole of the series of twenty-eight, after which time the mouth receives a further addition of four more, termed the wisdom teeth, thus completing the full set of thirty-two.

In the first of the accompanying plates, the lower figure represents the under jaw of a child in its seventh year; it contains the whole of the temporary teeth, with the two first molars of the permanent set about to protrude, one of which has just become visible. In the upper figure is shown the complete adult set; in this, on the left hand side, is given the order of succession, and on the right, the respective years in which the different teeth usually make their appearance.

## IRREGULARITY OF THE TEETH.

“There is nothing, as it regards the beauty, health, and durability of the permanent teeth, more to be dreaded, and at the same time more easily prevented, than an irregularity in their arrangement. It always occasions a more or less striking deformity in the features of the face, according to its nature and extent, and always increases the liability of the teeth to decay.”\* It is very important, therefore, that every attention should be paid to the mouth during the period occupied in the development of the second set; but it is equally so that all *unnecessary* interference should be studiously avoided. Under the plea of preventing an evil, for which, in all probability, no cause might exist, a much greater one, to say nothing of the gratuitous and unwarrantable cruelty inflicted, has often been produced by an injudicious meddling with these operations of nature. This subject, unfortunately, does not receive from the generality of practitioners, that consideration

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\* *Dental Surgery*, by C. A. Harris, M.D., p. 89.

which its importance deserves; nor do the governing laws, by which the arrangement of the teeth is influenced, appear to have been sufficiently well understood, as to have afforded any certain criterion, whether interference be required or not. I shall, therefore, describe the indications I have found of most value, and by which I have been guided in the treatment of irregular denture.

There are two extreme variations in the form of the curve produced by the position of the teeth along each side of the jaw, towards one or other of which, every mouth has more or less tendency. These are the semicircular or horse-shoe form, and the elliptical or truncated cone; the former is represented in plate 1. fig. 1., the latter in plate 2, fig. 1.

It is not to be supposed that these variations would be exclusively confined to the teeth themselves, nor is this in reality the case, other parts of the mouth present characters differing as widely in their respective formations: of these, the palate or roof of the mouth, offers the most striking peculiarities. In some

instances, it is shallow and even in form, while in others it is deeply vaulted, with the sides contracted, and irregular in the curve. But on comparing together the casts of a number of mouths, *similar in the shape of the dental curve*, this part is found to present a resemblance equally faithful. A peculiar form of the palate is constantly attended with a relative peculiarity in the shape of the denture; whence one is led to infer that these characteristics influence each other, or are allied in the manner of cause and effect. Now as the palatal and maxillary bones are formed, and, in conjunction with the tongue, brought into action prior to the formation of the roots of the teeth and their alveoli, the probability seems to be, that the form of the palatal arch is the governing cause of the shape of the denture. That this is really the case, and that the dependency of the latter upon the former may be ascertained, is, to my own mind, clear beyond the possibility of doubt; nor is this a hastily formed opinion, but the result of long-continued and careful investigation.

The effect of pressure exerted against the side of a tooth, is to cause an alteration in its position; and whether this pressure arises from any of the natural organs forming parts of the mouth, or is the result of extraneous mechanical aid as practised by the dentist, the part performed by nature is precisely the same. The walls of the alveolar cavity become absorbed; but as the process of reproduction goes on simultaneously, these portions of the socket are formed anew, in close contact with the fang, thus fixing the tooth firmly in its altered position.\*

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\* The extreme facility with which almost every species of malformation of the mouth may be corrected, by means of simple mechanical arrangements, is often a matter of the greatest surprise and astonishment to those who were before unacquainted with the fact. The possibility of effecting this change, however, is limited to the time before the system arrives at maturity, which is from about twenty-five to thirty years of age; after this period the inflammation set up in the periosteum, generally renders the tooth the cause of so much pain as to require its removal. This is not an unusual occurrence, arising from ill-fitting artificial teeth; the pressure of the plate being exerted on the natural teeth, instead of resting entirely on the gums, produces in the former a rocking motion every time the mouth is closed, and when this is the case but seldom fails to result in their destruction.



To comprehend the *modus operandi* by which the arrangement may be influenced by the organs themselves, a reference must be made to the upper portions of the figures in plates 1 and 2. These show the forms of the palate corresponding with the two extreme forms of the dental curve.

The principal nourishment in early infancy is obtained by suction; to accomplish this act, the end of the tongue must be pressed close to the roof of the mouth, and the air and moisture partly withdrawn from between them. Now as the tongue is a soft and yielding substance, capable of extension on every side, it will readily be seen in what manner the form of the surface against which it is pressing, may regulate the amount and direction of its expansion. Thus in plate 1, figure 1., the form of the dental curve is precisely that which would be anticipated from the shallow and regularly arched roof; the tendency of the tongue, when forced against it, being to spread out laterally. The effect of this is beautifully illustrated in the separation of the temporary teeth as the period



approaches for their being shed. The teeth not increasing in size, while every other part continues to grow, and the pressure from mastication succeeding that of suction, they are forced outwards, and made to occupy a portion of a larger curve, which is then left with intervening spaces.

In the other case, when the palate has the form represented in plate 2, figure 1., the lateral expansion of the tongue is prevented by the almost perpendicular sides of the arch, whereof the increase in size is then, in a great measure, confined to its length, thus producing a denture of narrow and elongated form. Under these circumstances, the permanent teeth, receiving no pressure from the tongue within the curve, are entirely at the mercy of accidental circumstances; and it is under these influences that malpositions are produced. Irregularity of arrangement is principally confined to the ten anterior teeth in either jaw; of these, five are situate on each side the medial line, and constitute a separate arch in both parts. The two incisors, and the two bicuspid, appear suc-

cessively, with the intervention of a space between them; this is required for the reception of the cuspid—the last of the five to make its appearance\*—and on the extent of this space depends the ultimate regularity of the mouth. In the semicircular form of the dental curve, with its accompanying shallow palate, the pressure of the tongue from within the arch, preserves the space from contraction; but in the opposite form, particularly if the temporary cuspid be prematurely removed, the pressure of the lips from without may lessen its width, and by thus leaving insufficient room for the succeeding tooth, cause a considerable deformity to the mouth.

The situation of the cuspid within the bone of the jaw, before its protrusion from the gums, being in the upper considerably above the other teeth and on the outside of the arch, accounts for the formidable appearance it presents when first showing itself in the mouth.† Although in its natural and right position, it has, at this

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\* Plate 2, fig. 11.

† Plate 2, fig. 11.

stage of its progress, so awkward and formidable an appearance, that it is by no means uncommon for parents to apply for its removal, under the supposition of its being misplaced; its removal is a step which ought never, under any circumstances, to be resorted to, for should there be insufficient room for its even arrangement when the denture is completed, the required space may be gained by the removal of a bicuspid, the loss of which would be no apparent detriment. Several instances have come under my own observation where the unwarranted removal of these teeth have produced irremediable deformities. The following case (of which I have preserved casts), will in some measure illustrate the effects which may result from so seemingly trifling a cause.

A young lady, about sixteen years of age, was placed under my care on account of an irregular and overlapping position of the incisors of the lower jaw. From an inspection of the mouth, I found the upper denture presenting a peculiar one-sided appearance; this had been caused by the extraction of the left

cuspid, which had rendered the arch on that side, nearly flat. On the other the *lateral incisor* having been removed, its place was occupied by the cuspid, which, from its greater thickness and more prominent position, gave to this side of the mouth a sharp and angular form. The unnatural contraction of the arch, caused by their loss, had been the origin of the deformity in the lower jaw; whereas, judging from the appearance of the palate, as well as the position of the teeth themselves, there is every reason to believe that had nature been left to herself, no interference would ever have been required.

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#### THE EFFECTS OF ARRANGEMENT ON THE DURABILITY OF THE TEETH.

The advantages resulting from a regular and uniform arrangement of the teeth, as before observed, are by no means confined to its influence on the expression of the countenance. Their durability is materially affected by their relative positions, and the form of the dental

curve. Thus, when two of the upper teeth are so situate that one stands partly before the other, one or both generally decay at the parts in contact. In such a position they are forcibly pressed together between the tongue and the upper lip; this pressure crushes the enamel and bruises the bone beneath it, when the inflammation so induced, invariably ends in the destruction of the part affected. MR. BELL observes, that "the true cause of dental gangrene is inflammation, and the following appears to be the manner in which it takes place; when from cold or from any other cause, a tooth becomes inflamed, the part which suffers most severely is unable, from its possessing comparatively but a small degree of vital power, to recover from the effects of inflammation, and mortification of that part is the consequence." The simultaneous, or successive decay of two teeth, where they touch each other, has given rise to the absurd idea, that the disease is communicated from one to the other by infection. But the nature and structure of the teeth clearly demonstrate such a mode of propagation to be

impossible ; while it may readily be imagined, that the pressure of two teeth against each other may result in an injury to both, although not necessarily to an equal extent, yet sufficient to ensure their ultimate decay, the more injured one preceding the other in proportion to the greater amount of injury sustained. But not only are those teeth which are unevenly placed almost certain to be destroyed by decay ; there are others which, possessing the utmost regularity of arrangement, are equally liable to its attacks. This evil, in the latter case, arises from the peculiar form of the dental curve, the semicircular being that in which the teeth are most subject to destruction. It may be frequently observed, in the widely expanded mouth, that the front teeth are decayed at their sides in contact ; and if a close inspection be made, many of the others will, in all probability, be found in a similar state. The immediate cause of this devastation, is lateral pressure ; but it may reasonably be asked, why this shape of the denture, more than the other, should be under its influence ? particularly as

the teeth are evenly arranged, and appear to have plenty of room. It will be understood that this form of the denture results from the teeth being forced somewhat outwards by the expansion of the tongue, and were it not for the resistance offered by the cheeks and lips, which preserves them closely connected in a regular curve, they would recede to a greater distance and be left with spaces between them. Thus, the form of the curve being that of a regular arc or portion of a circle, the force which is applied *externally* becomes converted into a *lateral* pressure, and affects, to a greater or less extent, the whole of the denture. This outward force arises from the pressure of the cheeks and lips, and is brought more immediately into action by the motion of the mouth in the act of mastication. The evil is avoided in the elliptical form, where, from the absence of pressure from the tongue, the cheeks are mainly instrumental in arranging the teeth. Being in possession of these facts, and knowing the cause from which the different effects are produced, we are enabled, in a great degree, to prevent the loss of



the teeth by timely and judicious treatment. One of the most effectual means of preventing their destruction lies in the use of the file; by this, the sides of the teeth, where the enamel is sufficiently thick, should be reduced to a flat surface; as the greater the extent over which the pressure can be diffused, the less detrimental are its effects.

In the semicircular denture, the teeth being more liable to decay at their sides in contact, where, in the bicuspid and molars it is screened from the view, it is, consequently, not often discovered by the patient until its effects obtrude themselves upon the attention in a manner too forcible to be disregarded; but in the elliptical form, where the decay less frequently occurs in this situation, it is oftener found in the indentations on the grinding surfaces of the molar teeth, in which, from the imperfection of the enamel covering, the bone is exposed to the action of pressure as well as of stagnant food and moisture.



## DECAY OF THE TEETH, ITS NATURE AND TREATMENT.

This disease “invariably shows itself on the external surface of the bone, immediately underneath the enamel, and its existence is, in many cases, first indicated by an opaque spot on that substance, occasioned by partial breaking down of its crystalline structure: in others, its presence is shown by the discoloured bone being seen through the semi-transparency of the enamel. If at this stage of the disease the tooth be sawn through at that part, so as to intersect its centre, a brown mark will be found in the bone, immediately under the opaque spot of the enamel, extending more or less into the substance of the tooth, in a line tending directly towards the cavity; it is darkest at the surface, where, from the disease having commenced at that part, its progress is more advanced, becoming gradually lighter towards the centre.” (plate 3, fig. III.) “It will be recollected that the enamel is crystalline; that the crystals are parallel to each other, and perpendicular to the surface of the tooth. From this arrangement it

is obvious that the most solid and continuous support is necessary to preserve them from becoming displaced, and losing that perfect unity of structure upon which the strength of this substance mainly depends. Hence it follows that on the removal or softening of the smallest portion of the bone of the tooth, immediately under the enamel, and on which the terminations of the crystals had rested, they will, in some measure, give way; and this, though not to such a degree as at first to exhibit any obvious displacement, yet sufficient to show the diminution of their cohesion, by the loss of that semi-transparency, and that perfect integrity of texture, which characterize a sound and healthy condition of the enamel. Commencing in the manner just described, the mortification continues insidiously to increase, and destruction of the substance of the bone soon takes place, still preserving the same direction, from the surface to the centre: it becomes blackish and softened, and at length the enamel, having lost its support, breaks away and suddenly

discovers a cavity, which perhaps had not previously been suspected to exist."\*

Mortification, having once commenced in a tooth, continues to destroy the bone beneath the diseased part in successive layers, until the central cavity becomes exposed. *To put an effectual check, therefore, to its progress, every minute portion of the decayed bone must be removed.* This may sometimes be done with the file; but when the disease has proceeded too far for this method to be adopted without removing a large portion of the sound substance of the tooth, recourse must be had to suitable cutting instruments. The cavity, however, thus made, would soon engender disease in the healthy bone, by exposing it to the action of stagnant food and moisture, were it to be suffered to remain unprotected. It will, therefore, be necessary, after the operation, to fill up the hollow with some substance impervious to the action of fluids. For this purpose, pure gold in thin leaf is introduced, and con-

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\* *Bell's Lectures*, p. 120.

solidated by great pressure, so as to occupy the entire vacancy, and in some degree restore the original form of the tooth. Many preparations have been used for the purpose, but there is no substance which answers so completely, as pure gold; although occasionally, where the decay has become extensive, and where some of the conditions necessary for rendering its employment practicable may be wanting, compositions, which can be used with less pressure, may be advantageously resorted to; and be the means of preserving for a few, or perhaps for many years, teeth which would otherwise have been doomed to extraction. The success of the operation depends very much upon a healthy condition of the tooth and its adjacent membranes at the time of its being performed. If the gums be inflamed, or the tooth itself in a sensitive state, there is little chance of its being effectual; for the bone, being in a state of expansion when the stopping is applied, contracts when recovered, and leaves a space around the plug, sufficient to allow the entrance of fluids, which, by being thus confined, tends greatly to accelerate the progress of decay.

Whenever the operation is productive of pain, it should be discontinued, until, by the application of proper remedies, the parts have become insensible to pressure; it then may be proceeded with and completed, without the least inconvenience. The most favorable period for arresting the progress of decay is before the enamel has given way by the decomposition of the bone beneath it; at this stage the tooth exhibits only a speck or brown mark on its surface, and it is only by drilling out the discoloured bone that a cavity is formed to receive the stopping. Like all the other branches of dental science, this department has, within the last few years, received many important improvements: the number of teeth, in which the operation proves successful, under the present mode of treatment, being far greater than formerly, although many are now attempted, which, a few years since, would have been deemed impracticable. But this success must be understood as applying only to the educated and more honourable class of practitioners; for in spite of the boastful pretensions of those adver-

tising quacks, who offer "to restore teeth however painful," and to make them "better than new;" their practices have tended materially to bring the operation into disrepute and cast an unmerited odium on the profession at large.\*

From the preceding observations on the nature and progress of dental gangrene, it is sufficiently obvious that "stopping" the tooth is only a secondary operation, and can be of no possible service towards preventing it unless the disease be entirely eradicated. Yet, the operation, as it is too frequently performed, consists in merely wiping out the cavity, or often omitting even this step, and filling it with the vaunted composition which is to work so wonderful a cure. Thus, no attempt having been made to arrest the disease, it is not surprising the result should be a failure, nor that complaints, loud and frequent, should attend such flagrant malpractice.

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\* "With a knowledge of the physiology and pathology of these organs, the caution of the scientific and honourable practitioner, in not holding out the promise of certain success, where he knows the result must necessarily be more or less doubtful, will be well contrasted with the unhesitating boast of the empiric."—*Bell's Lectures*, p. 144.

## EFFECTS OF TARTAR ON THE TEETH.

The presence of a decayed tooth, which, from the pressure of food on its pulp, or from any other source, has become productive of pain, is highly injurious in the mouth, as it prevents the other teeth, on that side, taking their proper share in the act of mastication. The immediate result of this suspension of their duties, is the accumulation of a calcareous deposit on their necks. This substance, which is termed tartar or salivary calculus, is a natural deposit, thrown down from the saliva, in which it had been previously held in solution. At the commencement of its accumulation it is soft and friable, but in a short time, acquires the solidity of marble. Like the latter substance too, it is susceptible of being stained by colouring matter, such as the smoke of tobacco, for instance; in which case the smallest particle of tartar becomes conspicuous, owing to the blackness contracted from the soot of the “precious weed.”

From the irritation which is produced in the gums, by the first layers of tartar pressing



against them, their edges become discolored and swollen, and ultimately separate from the necks of the teeth: and as the accumulation continues to increase, its injurious effects are augmented in the same proportion. The disease generally termed, "scurvy in the gums," has its origin in this source, and requires for its cure nothing more than the removal of the cause—the accumulated tartar from the necks of the teeth—and, in fact, nearly all diseases of the gums are dependent upon the state of the teeth, as they are but very rarely, if ever, affected after all the teeth are lost. The extreme degree of sensibility arising from an inflamed state of the gums, together with their sponginess which causes them to bleed on the slightest touch, make the operation of brushing the teeth to be exceedingly painful, if not altogether impracticable; and thus, by inducing a neglect of the ordinary means of retarding its accumulation, offers a favorable opportunity for its more rapid increase. A considerable deposit of tartar is always followed by an absorption of the gums and the walls of the alveolar cavities,



while the amount of substance so removed, is immediately replaced by fresh portions of the tartar ; thus it goes on, until the whole sockets have been destroyed, when the teeth, being deprived of their natural support, become loosened, and ultimately fall out. A temporary and deceitful support is often produced by the massive lumps of tartar, wherein the teeth are embedded, and which, while they remain entire, certainly tend to retain them in the mouth after their sockets are gone, although, in that state, they must be utterly useless. The supposition that the teeth receive support from an encrustation of tartar, and are injured by its removal, is not unfrequently urged as a reason for its being retained ; but the fallacy of such a plea must be obvious to every one ; the mischief is produced by the accumulation, and is not the effect of the operation required for its removal ; the latter merely exposes to view the extent of the injury which has been inflicted, while it puts a stop to its further progress.

The glands secreting the saliva, are situate above the upper molars on their outer side,

and at the back of the lower incisors under the tongue. These teeth, therefore, being placed so near to the tubes whence it is poured into the mouth, are the most liable to become loaded with tartar; and although the lower incisors are but very rarely attacked by decay there are scarcely any other teeth more commonly lost than these.

“As this substance is formed from the saliva, whatever cause produces an unhealthy action in the glands secreting that fluid, will be found invariably to occasion a greater deposition of tartar. Fever—indigestion, or any irregular state of the stomach—drinking, smoking, and similar causes of irritation in the salivary glands, whether local or constitutional, immediate or sympathetic, will produce it. The action of mercury is one of the most speedy and unfailing causes of its accumulation, as it not only induces an increased and unhealthy action in the salivary glands, but also, by rendering the gums highly susceptible, prevents the necessary precautions from being used by which the teeth might be kept clean.”\*

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\* *Bell's Lectures*, p. 199.

It will be seen, then, from the preceding remarks, that this subject is one of more than ordinary importance, so far as the preservation of the teeth is concerned, and that every means, which can in any way tend to prevent its accumulation, should be constantly adopted: and where concretion has already taken place, its immediate removal is adviseable. This operation is termed

#### SCALING THE TEETH,

And, when carefully performed, is unattended with pain, or even the most trifling inconvenience: it should be accomplished by suitable instruments of hardened steel, and with care may be taken off without the slightest injury to the polished surface of the enamel. After it has been done effectually, the habit of frequently brushing the teeth offers the readiest means of preventing fresh accumulation. But as *much* depends upon the use of the *tooth-brush*, it is worth while to say a few words upon the proper qualities and form of this implement—its right construction being of more consequence than is generally supposed.

The essentials are, an openness of texture, to allow the hairs to penetrate between the teeth, and at the same time, sufficient strength and elasticity to enable it to remove all extraneous matter from their surface. With the usual kinds of brushes, whether flat on the face or rounded, it is impossible to do this, or, in fact, to do more than might be effected by the finger alone. Next in consideration to the form, is the quality of the hair employed. The modern system of sacrificing every other quality for appearance and cheapness, has embraced this very necessary article within its range. The method of bleaching the hair, while it renders it beautifully white and transparent, at the same time deprives it of far more valuable properties, namely, strength and the power of resisting the effects of warmth and moisture. The almost universal fault of the hairs coming out in the mouth, arises from the hasty and insecure method by which they are put in the bone: it will, in all probability, continue to exist, unless the secure and old-fashioned plan of fastening with silver wire be again resorted

to. However trifling these details may appear to the reader, I lay much stress upon them, and have been at considerable pains to ascertain, not only the most serviceable material, but the best form of construction for a tooth brush. The kind of brush I have found best fitted to the purpose, consists of but three rows of hair; of these the two outer are inclined from the middle, and the face is *deeply notched obliquely across*. By this arrangement the hair is able to penetrate the interstices, and to remove the tartar from between the necks of the teeth. I have had brushes made on this principle for some years past, and have found them fully adequate to all the purposes required.

Besides using the brush across the teeth, along the line of the gums, it should be passed up-and-down, by a rotatory motion of the wrist, and applied to their grinding surfaces, and the inner sides of the dental arch as well as the outer. The effect of the brush is considerably increased by the addition of some alkaline tooth powder, but as the action of this is purely mechanical, it is indispensable that it should

not contain any gritty or sharp cutting substance which can either abrade the surface of the enamel or injure the gums at the necks of the teeth. The admixture of acids, too, should be carefully avoided, as their chemical action upon the teeth is highly injurious: many of the tooth powders advertised for sale under the alluring promise of rendering the teeth beautifully white, frequently perform all that is promised, but only for a time, and then at the expense of permanent and irremediable injury to the teeth; they often contain an acid which effects a gradual decomposition of the enamel. The high polish, to which the latter substance is chiefly indebted for its beautiful appearance, becomes destroyed by the action of acids, after which, its roughened surface readily acquires discoloration, and retains it with so much tenacity, as to return to its original purity of color, only by a renewed application of the destructive agent. Where the flavor of camphor is not objected to, the camphorated chalk is the best preparation which can be used; but whatever may be the flavor preferred, the pre-

cipitated chalk is the most valuable substance for a basis; as, by its continued use, the natural polish of the enamel is considerably improved.

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### TOOTH ACHE, AND ITS TREATMENT.

The exposure of the internal membrane of a tooth gives rise to a disease of the most painful and distressing character; yet it singularly happens, that, although there are comparatively few persons but experience this suffering at some period or other of their lives, there is, perhaps, no other malady receiving popular treatment, where the symptoms of the case are so utterly disregarded.

The possibility that tooth ache may arise from more than one cause, seems to be overlooked as it were with common consent. Applications of the same nature are almost universally resorted to, without any regard being paid to the symptoms. These are generally powerful stimulants, such as, the essence of pellitory, tincture of ginger, brandy, camphor, kreosote,



the essential oils of cloves, cinnamon, cajeput, &c. The fame these remedies have acquired, must be attributed to the value they actually possess when applied under *one particular form* of the disease; that is, when the pain is caused by the irritation of the air, &c., on the newly exposed membrane: this may be mostly mitigated, and, before inflammation has commenced, often entirely removed by the application of a stimulant. The success of two or three experiments of this kind is sufficient to establish the reputation of the medicine, which is forthwith announced to be a “never-failing specific;” but that these are not suitable in every case, will be readily understood when the different sources of the disease have been pointed out.

A tooth having two membranes—one lining the internal cavity contained in its centre, the other, the external covering of its fang—and both membranes being liable to inflammation, give rise to the tooth ache; the symptoms, however, are found to vary according as one or the other of these is affected.



The peculiar characteristics of both are so distinctly marked, that no difficulty is encountered in assigning the disease of either to its true source. But this discrimination is one of the first points to be attended to, as, on its correctness, depends the entire success of the remedial measures to be adopted.

In a case of tooth ache, where the attack is confined to the *inner* membrane, the symptoms are distinguished by an excessively acute and lancinating pain, recurring at different intervals, and coming in sudden and darting paroxysms of the most excruciating torture, although they are generally of but short duration. The pressure of food during mastication, or the contact of hot or cold liquids, is sufficient to excite them, but independently of these, they frequently come without any previous intimation. The tooth itself remains perfectly firm in its socket, and every other part of it may be pressed upon without inconvenience; but on the slightest contact with the exposed portion of the membrane, the pain is instantly produced in all its violence. It is here the usual remedies

before mentioned may be of service; of these, none perhaps are better than kreosote, the application of which frequently acts like a charm, affording instantaneous relief. But when, from the continued irritation, or from exposure to cold air, the membrane becomes attacked by inflammation, the symptoms are greatly aggravated, the paroxysms returning more frequently, while at no time is there an entire cessation of the pain. This arises from the swollen state of the membrane causing it to press against the sharp edges of the hole in its bony cell, from which it may often be seen to protrude. When in this state, the successive applications of the preceding remedies, even if they afford a momentary relief, tend greatly to increase, rather than to remove the cause of pain. The most effectual means of procuring relief and checking the progress of the inflammation, will be found in having recourse to repeated doses of saline aperient medicine, and the applications of hot fomentations to the face. If the attack be allowed its course, it generally terminates in a few days, by the sup-puration of the membrane.

When the *external* periosteum (the membrane covering the fang,) is the seat of inflammation, the pain is of a widely different character. It is then, a dull, heavy, and continued aching, often extending along the whole jaw, or even affecting the entire side of the face; the tooth becomes loosened in its socket, from which it is slightly started, and being elevated above the level of those on each side of it, when the mouth is closed is productive of considerable pain and inconvenience. The surrounding gums, from their intimate connexion with the membrane, soon become swollen, which state is accompanied by an unusual degree of heat and tenderness. Another peculiar feature in this form of tooth ache, is, the increased pain experienced on the application of moderate warmth, but more particularly on retiring to rest. In its slighter attacks, this is the only time when the pain is felt. The best treatment under these circumstances, consists in applying hot fomentations or embrocations to the face; or when the symptoms are more urgent, leeching or lancing the gums, and

the use of aperient medicines. By the aid of the ordinary mouth leech-glass, leeches may be made to adhere to any part of the gums required ; after these have fallen off, the bleeding should be encouraged by continued ablutions with warm water. If the inflammation be suffered to take its own course, in this, like the preceding, it terminates in the suppuration of the membrane; and there being no means of escape for the matter, it remains imprisoned around the fang of the tooth, which then requires to be extracted to effect its liberation ; unless it should find its way through the sides of the cavity, forming what is commonly termed a gum-boil, but is in reality an alveolar abscess.

Fomentations and poultices, which are of great service in reducing inflammation in its earlier stages, prove also the most powerful auxiliaries in accelerating the process of suppuration, and of directing the progress of the matter to the surface ; for this reason, their use should not be continued to the face externally, long after suppuration has commenced, as it would then have a tendency to form an opening

on the cheek, the result of which would be, a scar and probable disfigurement for life. An efficient substitute for an external poultice will be found in a roasted fig, or a piece of the inner crust of bread soaked in milk or water, and applied, as hot as can be borne, to the outer side of the gums. This treatment should be continued until the abscess either breaks of itself or is opened by the lancet.

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### EXTRACTION OF THE TEETH.

Formerly, when the proper treatment of the teeth was less understood than it is at the present day, this operation was much more frequently resorted to. It was then customary to remove almost every decayed tooth as soon as it had become the source of pain, and very often even before that, under the erroneous impression that by suffering it to remain in the mouth, its disease would be communicated to the one adjoining; the fallacy of this idea, however, has been previously pointed out. The

mere exposure of the internal membrane of a tooth, even should it have been painful, is no bar to the operation of stopping; but the first step must be, to eradicate disease, and then to render the membrane sufficiently callous to bear the effects of pressure. The simple, speedy, and at the same time, effectual, and painless manner in which this, in most cases, can be accomplished, is one of the greatest triumphs of modern dental surgery, and has been the means of saving innumerable teeth from extraction, which otherwise must have been their inevitable fate. Extraction "is a measure which should not be resorted to until every other has proved ineffectual; it ought, also, never to be decided upon by the patient's feelings. Frequently, from cold or other causes, a painful sensation will be felt in one tooth, which after a few hours, will be transferred to another; and if, under the first impulse, the tooth primarily affected should be removed, the patient may have the mortification of knowing that a tooth has been extracted, which, but for this, might have remained serviceable for years. On

this account it is always preferable to rely on an opinion formed from inspection.”\*

A tooth should never be removed while the least chance exists of its being retained to be of further service, a rule which is equally applicable to the first or temporary set. These teeth are frequently sacrificed under the impression that such a step may be taken with impunity, but a reference to the sketch in plate 3, fig. IV., which is a section of the lower jaw-bone, showing the connexion existing between the first tooth and its successor, will exhibit this in a different light. The membranous bag in which the new tooth is formed, being united to the neck of its predecessor, will be torn through on the premature extraction of the temporary tooth. If this should take place before the coating of enamel on the new tooth be perfected, the healthy and uniform deposition of this substance is very liable to be interfered with. The possibility of an

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\* *Advice on the Care of the Teeth*, by Edwin Saunders,  
M.R.C.S., &C., p. 72.



interruption to the process is proved, by the occasional uneven and ridged appearance of the upper and lower incisors, more particularly on their cutting edges; this forms a remarkable peculiarity, which often, to a greater or less extent, runs through an entire family, and is to be attributed to a delicate state of the health and constitutional disturbances at the time when the process of secreting the enamel should have commenced.

The injurious practice of extracting the temporary teeth *before their appointed time*, cannot be too strongly deprecated, as it is often the cause of the very evil their premature removal was intended to prevent; that is, an irregularity in their permanent successors. The lower incisors and cuspids are more especially the victims of this species of treatment; the permanent incisors being much larger than their temporary predecessors, are unable to arrange themselves evenly in the space formerly occupied by the latter; therefore, to make room for the *permanent central* incisors, the *temporary lateral* ones are removed; and again to



accommodate the *permanent lateral* incisors, the *temporary cuspids* are extracted, giving to the four new teeth, by these means, all the space previously taken up by the six. Besides the liability of injury to the new teeth, in consequence of their growth being interfered with, there are two other kinds of evil arising from this mode of treatment; one is, the danger of the upper lateral incisors getting *behind* those of the lower jaw, and the other, the almost certainty of the permanent cuspids assuming a very prominent and unsightly position. The new teeth make their appearance in the mouth long before the bones of the jaw have arrived at their full growth, therefore, any unevenness in the position of the lower incisors, during the first two or three years, is a matter of no consequence; for even where the ulterior growth of the bones does not afford sufficient space for their regular arrangement, it is very easily obtained by artificial means, and is one of the easiest kinds of deformity to rectify. When only a small space is required, it may be gained by passing a thin file between them, but when

more room is necessary, it is better to remove one, when the others speedily approximate, and filling up the vacancy, render its absence so unimportant as to escape detection.

The necessity for extracting the temporary teeth, on account of their being decayed, and the pain and inconvenience which attends the exposure of the internal membrane, may, in a great measure, be avoided by the constant use of camphorated chalk as a dentifrice: the habit of brushing the teeth every morning cannot be commenced too early after the whole of the first set have made their appearance, using, at first, only plain water and a soft brush, but when any have become decayed, substituting a harder brush and the camphorated chalk; this will render the pulp less sensitive, and also materially assist in promoting its absorption.

The very great improvements lately made in the construction of instruments for extracting the teeth, have done much towards mitigating the torture of this dreaded operation, by abridging, very materially, the length of time required for its performance. The instruments now

used in the greater number of cases are termed "Forceps:" these have the beaks adapted to fit the necks of the teeth they are intended to remove. When the appropriate pair is applied to a tooth, there is seldom any necessity for lancing the gums, as these are sufficiently detached by the instrument immediately before the tooth is extracted; thus avoiding an operation which not only produces considerable delay, but is also, by many persons, dreaded almost as much as the removal of the tooth itself.

It is generally imagined that the removal of "stumps" is attended with more suffering than is caused by the mere extraction of a tooth; but this is by no means the case, for with very few exceptions, they may be taken out with the greatest facility, and with far less pain than would be supposed: the much-dreaded "punch" being entirely superseded by instruments of a more scientific and suitable construction.

The equally-abhorred "key," is, also, another instrument which appears likely to share

a similar fate ; but as much misapprehension prevails regarding its principle, and the mode of applying it, a description is given to point out the different results of its *use* and *abuse*. It consists of a thick cross handle at one end of a shaft, and at the other, an oval knob, corresponding to one beak of the forceps ; when this knob is held against the side of a tooth, the curved claw, hanging by a joint to its upper end, catches hold on the opposite side ;\* and if, while thus fixed, the handle be slightly turned, and at the same time pressed in a direction *away from the gums*, the tooth will be held tightly between the knob and the claw.

The tooth-key having been the principal instrument in use for very many years, is found in the hands of every individual venturing to extract a tooth, even down to the village blacksmith, who occasionally includes this in his ample list of acquirements. Its capability of being *improperly* applied by those ignorant

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\* As seen in figs. I, II, and III, plate 4, which are end views of the instrument—the shaft and cross-handle at the other end being omitted.

alike of its power and principle of action, has been productive of many frightful and serious accidents, and which have had a tendency to excite distrust in the *instrument*, by attributing to it those unfortunate results, which, of right, should have been ascribed to the unskilfulness of the operator. In proof of this, it will be sufficient to point out the erroneous manner in which the key *may be*, and too often *is* affixed for the removal of a tooth.

The following extract, with its accompanying diagrams, figs. I. and II., plate 4, are taken from a recent work entitled “*Observations on the Extraction of Teeth.*”

“Fig. 1. A transverse section of the upper jaw, showing the position in which the fulcrum is generally placed to remove the tooth.

“Fig. 2. A transverse section of the lower jaw, with the key placed to remove the tooth.”

It is a commonly received opinion, that the key acts as a lever, with which a tooth may be torn from its socket by a purchase of its knob

or fulcrum, upon the gums. To enable it to effect this, a pressure greatly exceeding the resistance of the tooth must be made with the knob in order to keep it from slipping; now, when it is considered that this pressure is made upon the soft parts of the mouth, it is not to be wondered at that much soreness, and frequently severe bruises with ulceration, should attend so barbarous a practice. Nor are these the only evils by which its misapplication is accompanied. A portion of the alveolus is generally torn away with the tooth, a circumstance, however, of no further consequence beyond the additional pain which it causes; but when the walls are very thick, as they mostly are in the elliptical denture, a *small* piece of the bone is not so easily detached, the fracture then extends, more or less, on each side that portion within the grasp of the instrument, causing the loss of all the teeth included within its range.

In the correct position of the key, the lower part of its knob is placed at the very edge of the gums, as represented in fig. III. of the same

plate; when this is pressed away from the gums, it is similar in action to the two-handled forceps, and as Mr. Snell very justly remarks, "much less power than is generally used, is sufficient to remove a tooth with the key instrument, if that power is scientifically applied; but too often the instrument is made to act against itself."\*

Although the suitability of the instrument may greatly assist in facilitating the operation, yet, after all, the success of the latter depends much more on the ability and skill of the operator: the homely adage, that "bad workmen find fault with their tools," applies in no case more forcibly than in this. On making a comparison of figs. I. and II. with fig. III. of plate 4, it will be seen that, if properly placed, the key is equally safe with the forceps, and that the odium which has been heaped upon it, as well as upon those who venture on its employment, is altogether undeserved: and

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\* *Practical Guide to Operations on the Teeth*, by J. Snell, p. 98.



although seldom, perhaps, required by the dentist, yet, as it is still the principal instrument used by many practitioners for extracting the double teeth, it is a matter of serious moment that it be placed in its proper character in order to relieve the apprehensions of the patient.

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### ON THE ADVANTAGES OF ARTIFICIAL TEETH AND THE PRINCIPLES OF THEIR CONSTRUCTION.

Having seen how important is the office of the teeth in aiding the process of digestion, the serious injury resulting to the system from the loss of them becomes sufficiently apparent; and when it is remembered how frequently they fall a sacrifice to disease, even at an early age, the facility with which they may be efficiently replaced by the dentist, renders the combination of science with the mechanical arts, as applied to the construction and fixing of artificial teeth, not the least important among the many advantages daily accruing to the public, from the untiring industry and research of the present era.



As the art of supplying artificial teeth is the department of dentistry capable of conferring the most substantial benefits on the public, so is it the one requiring the greatest ability and attainments for its practice. Much ingenuity and an intimate acquaintance with the mechanical arts, as well as “a comprehensive knowledge of the anatomy and physiology of the teeth, and all the adjacent parts with which they are in connexion, a minute acquaintance with all the irregularities and diseases to which they are subject, and the causes and cure of them, are indispensably necessary for the proper insertion of artificial teeth.”\*

The discomfort and annoyance arising from inferior productions, although by no means unimportant, are of much less consequence to the patient than the mischief inflicted in the mouth by their ill-fitting, or having improperly applied fastenings. An artificial tooth may be so unskilfully inserted as to ensure the speedy loss of those to which its clasps are attached, and by

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Koecker *On Artificial Teeth*, p. 4.

filling up the enlarged vacancy, others may be made to share a similar fate, until, by a repetition of the process, the whole of the teeth may be lost ; thus rendering that which ought to have been the support and protection of those remaining in the mouth, the means of their destruction.

The teeth, in their natural state, are supported in the mouth by the insertion of their conical roots within corresponding cavities or sockets in the jaw. The gum, which is a vascular substance covering the bones of the jaw, and united to the teeth at their necks, is quite independent of the pressure arising from mastication. In a healthy state, it has but a trifling degree of sensibility, although, when inflamed, it becomes excessively irritable and painful.

In the insertion of artificial teeth, the gum is generally made to bear a part, and sometimes the whole of the pressure to which these are subjected; it must, therefore, be sufficiently obvious, that if this substance be in an unhealthy and irritable state, inconvenience and

discomfort must be the result, depriving the patient of the greater part of those advantages which might otherwise have been obtained. It is of no uncommon occurrence for the architect to expend nearly as much time and material in preparing a foundation, as in erecting the edifice it has to sustain, knowing, as he well does, that the stability of the superstructure depends entirely upon the solidity of its basis. Thus it is with artificial teeth, their efficiency in the more important office of mastication, resting almost wholly upon the state of the foundation.

No artificial apparatus can, however well constructed, be worn with comfort, so long as the gums beneath it are tender or unhealthy; and since it rarely happens when any of the teeth remain in the mouth, but that some or all of them are the victims of decay, or the cause of irritation and disease in the gums, it is evident that the restoration of the mouth to a healthy state must invariably precede any attempt at supplying its deficiencies. But this preparatory treatment must not be understood

as implying the necessity of all fangs or stumps being removed, as such is by no means the case; for these, when healthy, are extremely serviceable in supporting the pressure of the artificial teeth in mastication.

It has been previously observed, that after the extraction of a tooth, its bony socket, being no longer required, becomes gradually absorbed; this process occasionally occupies a considerable time, but it is indispensable, in order to the permanent utility of the artificial teeth, that it should be entirely completed before their insertion. If the model be taken before the socket is wholly absorbed, the plate upon which the teeth are fixed, although fitting most accurately at the time, soon becomes loose by the receding of the gums consequent on the completion of the process.\*

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\* The difficulty of rendering this subject sufficiently clear to the comprehension, or accommodating to the inclination of the patient, frequently leads to severe disappointment on both sides. The patient, weary of the inconvenience attending the absence of the teeth, becomes anxious for their replacement, and often ascribes to neglect or dilatoriness, the delay which the better informed judgment of

A method of replacing the front teeth sometimes resorted to, is, by fixing a new crown upon the remaining fang of the old one: it is termed "pivoting," and is only applicable to the six front teeth of the upper row. This, notwithstanding its apparent simplicity, presents many difficulties of accomplishment; but when well executed, is by far the most perfect and beautiful operation the dentist is called upon to perform. When, however, the fang of the tooth is either included in the loss, or incapable of receiving a new crown, the latter must be fixed by a different plan; this consists in adapting to the gums, in and around the vacancy, a plate of gold, upon which the new tooth is to be fastened; the whole is then held in its place in the mouth, by small clasps or springs embracing the necks of those teeth which occupy the most favourable situation for the purpose. To effect this mode of attachment, and allow

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the operator assures him to be necessary to his success; while the latter not unfrequently yields to importunity at the probable cost of an injury to his reputation, as well as the ultimate discomfort of the patient.

the plate to be taken out and replaced by the wearer with the requisite ease and facility, without injury to the teeth so employed, requires the possession of a very considerable amount of mechanical skill in the dentist, as well as the greatest nicety of execution in the work. The plate should be held firmly in its place, and rest entirely upon the gums, while the springs must press the teeth in no one direction more than another, but close around them with equal force on every side, yet so delicately as to render their presence imperceptible to the patient.\* . Under such circum-

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\* In making artificial teeth, the first step is to obtain an impression of the jaw in softened wax. Into this, when cold, is poured a mixture of plaster of Paris and water, where it is allowed to remain until perfectly set. The cast so obtained, after the removal of the wax, is then used as a model, from which other castings are made, and to which the plate and the teeth are afterwards adapted. Hence, it must be sufficiently obvious, that upon the accuracy of this impression in the wax, depends, in a great measure, the proper fitting of the artificial teeth in the mouth; for if the model be incorrect, the piece which is worked to it cannot be otherwise. When, however, the cast has been well taken, there is of necessity always some difference between it and the mouth, which requires an alteration to be made

stances the artificial apparatus may be worn with the greatest comfort, and will remain perfectly harmless to the teeth by which it is supported. Upon the same principle any number of teeth may be supplied, so long as two or three remain to which they can be affixed, but when there are none available left, the artificial teeth must be attached to the lower jaw by spiral springs.

Where molar teeth are wanted in the lower row, this plan is the best which can be adopted; the gentle but equal pressure of the springs

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to the plate and the elaps, to render them properly fitting and comfortable to the wearer. For instance, the necks of the natural teeth are generally smaller than the crowns, but in the model are equal in size; this involves the necessity of bending the elaps to adapt them from one to the other, and is a measure requiring considerable nicety and care. Again, some parts of the mouth are frequently puffy and tender, and yield more than others to the pressure of the wax. These parts, which, by the continued pressure of the artificial teeth, would become extremely sore and painful, render it necessary to make an allowance for them in preparing the teeth. Inattention to this circumstance is often the cause of extreme suffering, and converts that which ought to be worn with comfort, into a source of the greatest annoyance and misery.



preserving the separate parts steadily in their relative positions, while the bearing of the plates being distributed evenly over a large surface, or accumulated on those parts most able to sustain the pressure, is calculated to afford a degree of comfort in the mouth scarcely credible to the inexperienced. The principle of supporting an upper piece in the mouth by atmospheric pressure is sometimes resorted to, but this, except under peculiar circumstances, so far from possessing any advantages over, is very inferior to the usual method of insertion by spiral springs. The continual tendency of the teeth to drop in the mouth, when subjected to unequal pressure, or from any sudden exertion, causes a feeling of insecurity extremely annoying, and quite sufficient to prevent any who may have been induced to adopt the use of springs, wishing to be again without them. To adapt these springs and to give to them their correct action when the mouth is either open or closed, requires a thorough knowledge of the principles upon which they depend, and almost as much nicety of adjustment as the



hair spring of a watch ; yet so little is it regarded by many, that the points of attachment are frequently made in the most convenient spot, without any consideration as to its being the one indicated for their proper performance. It is this circumstance, causing the springs to act improperly, and not unfrequently to produce severe soreness in the mouth, which engenders in many persons a great dislike to them ; but it should be generally known, that when they are properly fixed not the slightest inconvenience is ever occasioned by their use.

With regard to the materials employed by the dentist, natural teeth mounted on sea-horse ivory or gold plates, were, until the last few years, those principally in use ; but one of the greatest improvements in this department of dentistry has been the introduction of composition teeth, made from mineral substances capable of receiving every variety of tint and shade. These possess, with remarkable fidelity, that peculiar and beautiful appearance which so strikingly pertains to the natural teeth, and when judiciously chosen, in shape to suit the

form of the mouth, and in tint and shade to match the complexion, and mounted with the requisite care, they may be said literally to defy detection. They offer, also, an antidote to the two insuperable objections made to the use of natural teeth ; they may be worn by the most fastidious with perfect satisfaction, while their mineral origin renders them free from all liability to decay or discoloration.

Mineral teeth, as well as natural ones, are only applicable to the anterior part of the mouth ; when molar teeth are wanted, sea-horse ivory is much more suitable for the purpose, and as the part is not seen when in the mouth, the appearance is a matter of little importance. This ivory, under many circumstances, is extremely valuable to the dentist, for where any great deficiency of the gums is required to be made up, it possesses nearly all the essentials for the purpose. The only objections which can be urged against it, are, its liability to decay, and the odour it sometimes acquires from the moisture of the mouth. These effects, however, may be greatly diminished, the latter,

indeed, altogether prevented, by immersing them at night in diluted spirit of wine, and brushing them well once a day with a hard brush, using at the same time some of the camphorated tooth powder.

Whenever artificial teeth are worn, this treatment should be pursued, whether it be a single tooth or a whole set: cleanliness being essential for preserving the health of the mouth, their removal for this purpose, at least once a day, is absolutely necessary. Some individuals may object to so frequent a removal, from the fear of injury to the teeth on which the clasps are attached, but if the latter are properly constructed, much less harm will arise than by their being allowed to remain in the mouth unmoved.

Artificial teeth are too much regarded as being connected only with the appearance of the mouth; the loss of those situate at the back, out of sight, being, to the majority, a matter of total indifference. But it should be recollected, that, as a masticating apparatus, the molars form the most prominent part of the denture, and what is equally important, they

also sustain the principal part of the pressure arising from the contact of the jaws. Thus, when these are lost, the whole of the pressure is thrown on the remaining teeth, which, from their peculiar form, are but ill calculated to resist its injurious effects, and in consequence become loosened to such a degree as to require removal from the mouth; but being perfectly sound at the time, the cause of the mischief is always attributed to disease in the gums, rather than to the true one, the absence of their natural protectors—the molar teeth. In the usual form of the mouth, the pressure made by the upper incisors, cuspids, and bicuspid, against those in the lower row, is generally in an *oblique* direction, and which, when the broad-topped molars are lost, tends to force them from their original position: the rocking motion thus produced, causes the absorption of the walls of the alveolar cavities, and the consequent loosening and falling out of the teeth which they contained. In order to prevent this, it is always desirable to preserve the integrity of the denture, by replacing the more important parts as they are successively lost.

## CONCLUDING REMARKS.

In the preceding pages, a description of the principal diseases to which the teeth are liable, with the most appropriate methods of their treatment, has been attempted: it only remains, therefore, to impress upon the reader the importance of resorting, *at once*, to remedial measures, when the necessity for their employment has been found to exist; for the earlier these are employed, the less extensive will be the ravages committed. Of the suffering experienced from the teeth, by far the greater portion is produced by mismanagement, or by neglect. Of the former, an instance may be given in the usual treatment of one of the commonest forms of tooth-ache, namely, that which arises from cold in the mouth—the application of brandy, &c., to a membrane already in a high state of inflammation. This is literally adding “fuel to fire,” and in direct opposition to the treatment required, which should have been, the use of aperient medicines, with leeching the gums, and hot fomentations, &c., to the face.

The results of neglect are but too obvious in

the being possessed of teeth sufficiently decayed to have become a source of inconvenience ; for had these been attended to before they were productive of pain, the progress of decay might have been arrested, and the teeth preserved in a useful state.

A further illustration of the baneful effects of neglect, is apparent in the injury inflicted on the teeth and gums, by suffering them to become encrusted with tartar : the result of this, as previously explained, is the destruction of the gums and the bony walls of the alveolar cavities, with the consequent denuding of the fangs and ultimate loss of the teeth.

There are no other kinds of injury more frequently and more extensively destructive to the teeth than these, nor are there any others where preventive measures may be adopted with greater certainty of success. This circumstance renders it the more desirable that the nature and treatment of them should be clearly understood ; for, it may readily be supposed, few persons would hesitate to resort to a simple and painless step to avoid the inevitable suffering which attends their protracted disease.

As it is impossible for persons to examine their own teeth in every part sufficiently close to detect the presence of decay at its *commencement*, it is highly important that the mouth be submitted to an inspection *periodically*. In the case of children this is indispensable; for it is necessary, not only that the proper assistance should be given where required, but, to obtain the fullest amount of benefit, that the most favorable period should be watched for, and the interference made at the suitable moment.

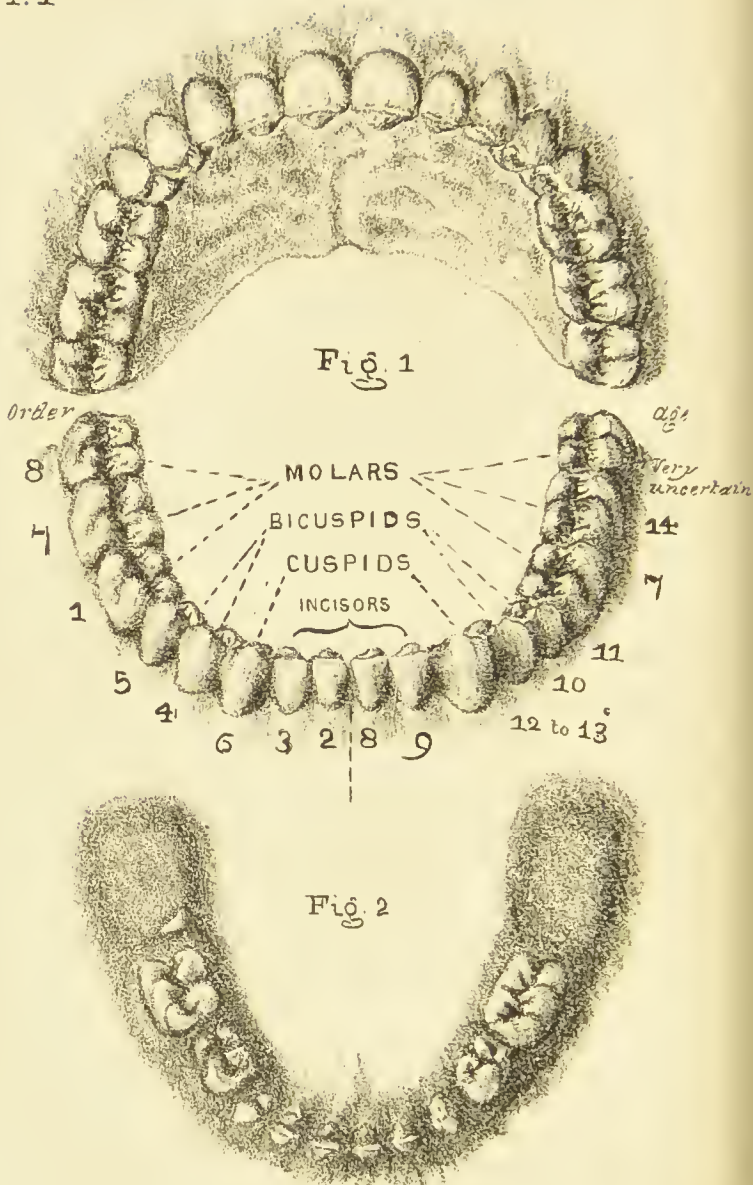
In the nature and origin of decay, the destructive effects of mechanical violence to the teeth may be clearly perceived; while in the requisite steps for its treatment and cure, the pernicious results of the advertised nostrums for *self-application* are sufficiently explained.

A dark and discolored appearance of the teeth is not always to be attributed to decay, nor is it often an indelible stain in their substance—the removal of an exterior coating of tartar, brings to light their long-hidden surface in all its original freshness and purity of color. When the disagreeable effects of this accumu-

lation in the mouth are considered; it is really surprising that any inducement can be needed for securing so much personal comfort without pain or inconvenience. It was the observation of Lord Chesterfield, that fine and clean teeth are among the first recommendations to be met with in the common intercourse of society; and certain it is, that, in forming our opinions from first impressions, we instinctively apply one of the grand rules of the great physiognomist, Lavater, that the countenance is the theatre on which the soul exhibits itself, and that "*as are the teeth of man, so is his taste.*"







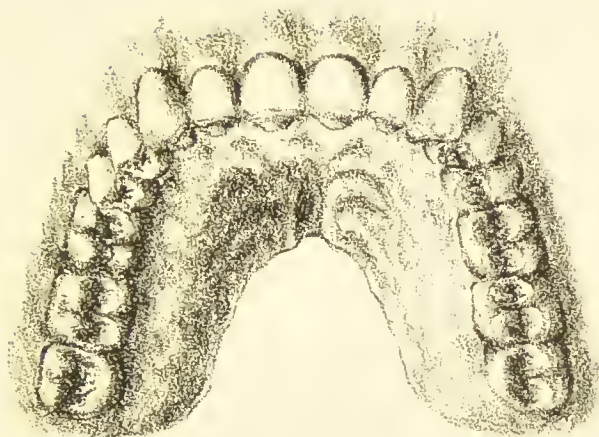


Fig. 1

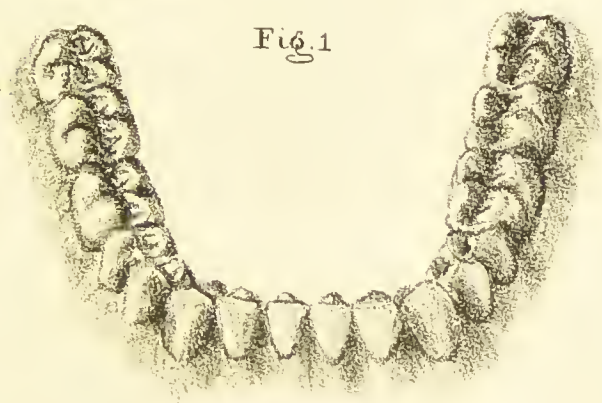


Fig. 2

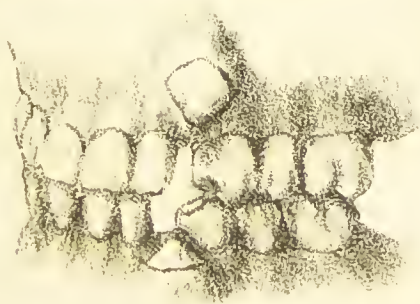








Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 1



Fig. 2



Fig. 3.

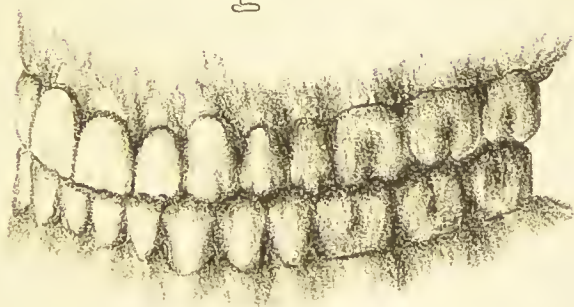


Fig. 4









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